

ABSTRACT OF THE DISCLOSURE

A method of immobilizing at least one molecule in a silica matrix to form a biosilicification product. The at least one molecule may be immobilized in the silica matrix at substantially the same time as the silica matrix is formed. The method comprises combining at least one silaffin polypeptide, at least one molecule, and at least one hydroxylated water-soluble derivative to form the biosilicification product. The silaffin polypeptide may be Sil1 protein from *C. fusiformis*, a fragment of the Sil1 protein, poly-L-lysine, or a synthetic polypeptide having affinity for silica. The at least one molecule may be an enzyme, a protein, a polypeptide, an antibody, an antigen, poly(nucleic) acids, microbial cells, plant cells, or animal cells. The hydroxylated water-soluble derivative may be silicic acid.

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